

4.0 MATERIALS AND METHODS

This section is intended to provide a uniform methodology for conducting field sampling and laboratory analysis of the compliance monitoring sites. Data reporting procedures are also discussed.

4.1 Sampling Schedule

The monitoring program will begin as soon as all Memoranda of Agreement have been executed between the City of Los Angeles and those agencies using the City's services, but no later than November 1, 2004. Monthly updates on the progress of the Memorandum of Agreements will be provided to the Regional Board.

The proposed compliance monitoring program comprises 67 sites monitored on a weekly basis. All routine samples will be collected on Mondays, and accelerated samples collected on Wednesdays and Fridays. For those sites where daily samples are currently collected, all data will be submitted to the Regional Board. As of March 2004, three agencies are prepared to handle sample collection and analysis for the proposed program: City of Los Angeles Environmental Monitoring Division (EMD), County of Los Angeles Department of Health Services (LACDHS), and Sanitation Districts of Los Angeles County (LACSD). Table 4-1 below shows the sites for which each monitoring agency is responsible.

In addition to the 67 sampling sites, the proposed program also includes nine observation sites as discussed in Section 3.2. Observations will be made weekly or monthly at each observation site, depending on the observation site's proximity to a compliance monitoring site. Observations are expected to be made by EMD and LACSD.

Table 4-1. Sampling Responsibilities.

Sampling Agency	Compliance Monitoring Sites								
	J1	J2	J3	J4	J5	J6	J7	J8	J9
EMD	1-02, 1-03, 1-06, 1-08, 1-10, 1-12, 1-13, 1-14, 1-16, 1-17, 1-18	2-01, 2-02, 2-04, 2-07, 2-10, 2-11, 2-13	3-03, 3-04, 3-05, 3-06, 3-08,	none	5-01, 5-03, 5-05,	6-02, 6-03, 6-05, 6-06	none	BC-1	MC-2
LACDHS	1-01, 1-04, 1-05, 1-07, 1-09, 1-11, 1-15,	2-03, 2-05, 2-06, 2-08, 2-09, 2-12, 2-14, 2-15	3-01, 3-02, 3-07, 3-09	4-01	5-02, 5-04	6-01, 6-04	none	none	MC-1, MC-3
LACSD	none	none	none	none	none	none	7-01, 7-02, 7-03, 7-04, 7-05, 7-06, 7-07, 7-08, 7-09	none	none

Tidal Influence

At a few freshwater outlets and storm drains, the tide may push the freshwater discharge back into the drain during high tide conditions. Per an assessment done by EMD, late fall and winter months are most affected by the prevalence of high tides lasting more than a week, for possibility of sampling at an alternate time or day in the week. For the five sites submerged during +3 tides (SMB-2-2, 2-5, 2-10, 2-11, and 2-13), the TSC would determine in advance whether these sites can be monitored on a different day of the week or at a different time on the scheduled sampling day in order to avoid problematic tides. During periods when it is not possible to avoid the +3 tide by sampling on another day or later in the morning on the same day, the sampling

agencies (EMD and LACDHS) should not sample. Simply note in the database that this site was submerged due to a +3 tide, and could not be rescheduled within the day or week.

In addition to the five sites that are submerged during +3 tides, other sites may experience reverse flow during high tides (i.e., ocean water is flowing into the drain or creek at point zero). To determine tidal influence, field personnel will record tide height at the time of sampling and note whether reverse flow was observed. Once in the lab, lab personnel will measure and record conductivity in the database. The TSC and jurisdictional groups shall evaluate this data to determine what tidal level interferes with obtaining a sample at these sites. It is important for purposes of TMDL compliance to know whether the storm drain or creek was tidally influenced, since the REC-1 beneficial use must be met at all times, not just during the morning hours when samples are collected.

Shoreline samples will be collected every morning. Sample collection must be conducted during daylight hours after sunrise and before sunset. Sampling staff will check the weekly schedule before departure. Samples will be collected usually between 7:00 a.m. and 11:00 a.m. It is more dangerous to sample at night both due to an increased probability of assault and poorer vision, especially during stormy periods.

4.2 Sampling Procedures

The objective of a sampling program is to provide a representative sample for bacterial analysis following defined safety and quality assurance guidelines. The quality assurance guidelines shall include sampling protocol as well as sample documentation, preservation and holding time requirements. All contracted samplers or agencies (EMD, LACDHS, and LACSD) shall submit a sampling SOP for review by Regional Board staff. This SOP shall be specific about safety considerations, sampling protocol, and quality assurance guidelines. Appendix C (Field Sampling Equipment and Supply List), Appendix D (Field Sampling SOP) and Appendix L (Safety) provide examples of EMD's protocols.

Each sample shall be associated with recorded observations of site conditions, which should minimally include sample ID, collection date and time, weather conditions including rain measurement, sample characteristics (color and turbidity) and sampler's name, refer to Appendix E. Additional information shall be recorded at the time of sampling of point zero freshwater outlets to provide useful site characterization data for the TMDL re-opener. This should include whether the drain flowed, an estimation of flow, if flow reached the surf zone and whether sample location was moved the allowable 10 meters during wet weather. Since samples collected by agencies such as City of Los Angeles-EMD, LACDHS and LACSD are usually associated with recorded observations of site conditions (requirement of POTW-NPDES permits) these forms can also be used as chain of custody documentation.

Sampling should only occur when conditions can be assessed as SAFE. The safety of the sample collector is the top priority and should preclude scheduled sampling.

At all sampling sites, samples will be taken at ankle depth and on an incoming wave. Point zero sites will have samples collected at the wave wash of the associated freshwater outlet year-round, except during storms or other unsafe conditions, when samples will be collected as close as safely possible to the wave wash, but no further away than 10 meters down current of the storm drain or outlet. Also, refer to Section 4.1 “Sampling Procedures” for how to handle tidally influenced drains.

Procedures for missed samples

For occasions when a regularly scheduled site is inaccessible causing a missed sample, or a sample analysis is compromised resulting in a missed sample, the site should be reoccupied and sampled on the earliest convenient day within the week of the originally scheduled sampling date.

Procedures during Rainfall Events

During rain events, the zero point sampling may be moved to a maximum of 10 meters away from zero point for safety reasons.

Numeric Targets

The numeric targets for the SMBBB TMDLs are those specified in the Basin Plan amendment adopted by the Regional Board on October 25, 2001, which are the same as the limits specified by AB411 bathing standards and bacteriological standards for recreational waters (See Table 2 below).

Waste Load Allocations

Waste load allocations in the SMBBB TMDLs are expressed as an allowed number of exceedance days. The number of allowable exceedance days at a given location is determined by the number of projected exceedance days during the 90th percentile year at either the designated reference site or historically at the location in question, whichever is lower. Allowable exceedance days, as determined by the reference site method, relative to a weekly monitoring schedule, are as follows:

- Summer dry-weather period = 0 allowable exceedance days;
- Winter-dry-weather period = 1 allowable exceedance day; and
- Wet-weather period = 3 allowable exceedance days

Procedures following Elevated Bacterial Levels (Exceedances)

For the first three years of the summer dry-weather period and the first six years of the winter dry-weather period, EMD, LACDHS and LACSD will conduct accelerated

testing 48 hours after the initial bacterial exceedances, and if necessary, EMD and LACSD will conduct accelerated testing 96 hours for those sites still exceeding bacterial indicators after 48 hours. For locations monitored by EMD, LACDHS, and LACSD, accelerated sampling, if necessary, will take place on Wednesdays and Fridays. Concerning analysis, all three indicator bacteria will be analyzed during accelerated monitoring. For those sites monitored by the responsible agencies, not all sites showing exceedances may be selected for accelerated sampling due to operational constraints. When this occurs, a systematic random selection of eight stations out of total stations showing bacterial exceedances will be made. However, if a site is deemed chronically problematic by the responsible agencies within that jurisdictional group, the group may select that site for accelerated sampling.

Table 4-2. Summary of Los Angeles Basin Plan bacteriological standards for recreational waters (REC-1).

Standard	Bacterial limits
Single sample for water contact ¹	Density of Bacteria on a Single Sample Shall Not Exceed: <ul style="list-style-type: none"> ▪ 10,000 total coliform bacteria/100mL; or ▪ 400 fecal coliform bacteria/100mL; or ▪ 104 enterococcus bacteria/100mL; or ▪ 1,000 total coliform bacteria/100mL, if ratio of fecal/total coliform exceeds 0.1
Rolling 30-day geometric mean ²	Geometric Mean of Bacteria Density over a 30-day Period Shall Not Exceed: <ul style="list-style-type: none"> ▪ 1,000 total coliform bacteria/100mL; or ▪ 200 fecal coliform bacteria/100mL; or ▪ 35 enterococcus bacteria/100mL

¹Regional Board Resolution 01-018
²CA Basin Plan Res 2002-002

The purpose of the increased monitoring is to identify the persistence of an exceedance, especially during dry weather when source identification will be a priority. This accelerated monitoring may not be as critical during wet weather at every location when the source of the exceedance is known to be storm water runoff. Accelerated testing during wet weather will not be conducted until the fourth year re-opener since this would not be a compliance issue until that time.

Equipment

Equipment and supplies needed for shoreline sample collection are listed in Appendix C.

Safety

In an effort to improve employee safety and health awareness and prevent occupational related injury and illness, the EMD and other participating laboratories have developed a safety program with the intention of satisfying the applicable federal, state, and local regulations. For example, EMD's Safety and Health Program is composed of specific elements required by Cal/OSHA General Industry Safety Order Section 5191:

Occupational Exposure to Hazardous Chemicals in Laboratories, and section 3203: The Injury and Illness Prevention Program, and any other applicable regulations. The written safety plan, titled *The Chemical Hygiene Plan*, is available to all employees for review, and should be recognized as management's commitment to ensure that all employees carry out their work in the safest and most efficient manner possible. EMD employees will be kept familiar with the division's written Chemical Hygiene Plan (CHP) through training, annual review and monthly staff safety meetings.

It is EMD's policy and the policy of other participating agencies to have a safe working environment for all of its employees and that all field and laboratory work be performed in a manner that provides the highest level of safety for the protection of every employee. See Appendix L for detailed safety protocols.

4.3 Analytical Methodology

For the purpose of bacterial TMDL monitoring, seawater samples shall be tested for the presence of total coliform, fecal coliform, or *Escherichia coli* (*E. coli*), and enterococcus bacteria. All three of these indicator groups shall be quantified from a single sample collected at each designated monitoring site. Necessary dilutions or aliquot volumes shall be processed to insure that reportable values can be determined. Bacterial results are reported as organism type per 100 mL of sample. When selecting analytical bacterial methods for TMDL monitoring, the importance of fast recovery times (24 hours or less) should be emphasized.

All laboratories performing analysis for TMDL bacterial monitoring shall maintain Environmental Laboratory Accreditation Program certification (ELAP administered by California Department of Health Services) for specified methods from ELAP's "Field of Testing 126: Microbiology of Recreational Water". Additionally, all laboratories shall submit detailed SOPs for review by Regional Board staff. Appendix G provides an example of a SOP developed by the City of Los Angeles-EMD. Each analytical method used for the TMDL monitoring program shall be an approved EPA or Standard Methods for the Examination of Water and Wastewater, 18th-20th edition (APHA 1992-98) method. Laboratories receiving Regional Board approval may use other analytical bacterial methods for marine recreational and TMDL monitoring. Each laboratory shall be qualified for specific methods by participating in an inter-calibration exercise currently being developed by SCCWRP.

Quality Assurance/Quality Control

All laboratories must employ a program that associates quality assurance with the laboratory facility, staff, instrumentation and equipment, materials and methods, media and reagents, and data validation. These QA/QC measures may be included in the submitted SOPs or defined in a separate QA/QC document such as Appendix I. The quality assurance procedures shall be in accordance with Standard Methods for the Examination of Water and Wastewater, 18-20th Editions (APHA 1992-98). All participating laboratories must maintain ELAP certification, provide QA/QC

documentation as required by Regional Board, and participate in periodic inter-calibration exercises.

Interlaboratory Calibration

Data from several laboratories (agencies) will be utilized to comply with the monitoring requirements of the Santa Monica Bay Beaches Bacterial TMDLs. At a minimum, the EMD, LACSD, and LACDHS laboratories will participate in this monitoring program. In order to ensure that these data are comparable relative to the level of quality, the participating laboratories will be requested to participate in quality assurance exercises. These QA exercises are meant to ensure standardization of sampling, analytical, and data handling/reporting methodologies and procedures, as well as intercalibration of the laboratories.

For the inter-laboratory calibration exercise, a performance-based approach will be used to ensure that data from participating laboratories are comparable. A calibration exercise utilizing a common sample will be analyzed by each laboratory. All participating labs will be required to fall within a ± 0.5 median log count comparability goal (Noble et al. 1999)

Data Translation

The IDEXX chromogenic substrate method E. coli results will be converted to fecal coliform data by implementing a 1:1 translator. The application of a 1:1 translator was approved by the Los Angeles Regional Water Quality Control Board in October 2002 after review of the IDEXX and Membrane Filtration Study conducted by the City of Los Angeles (approval letter dated October 16, 2002, from Dennis Dickerson, Executive Officer).

4.4 Data Management and Reporting

Data Tabulation

Results will be entered into Excel spreadsheets that automatically compute results (MPN/100 mL for CS analysis and CFU/100 mL for MF analysis). These results will be given secondary review, corrected as needed, to ensure error-free data entry. Examples of microbiology's data worksheets can be found in Appendix E. Data acquisition, validation, reduction, and reporting procedures can be found in Appendix H.

Data Format and Archive

All data collected will be archived within the City of Los Angeles' Environmental Monitoring Division (EMD) LIMS database or comparable database. For non-City of Los Angeles monitoring agency performing bacteriological analyses, data will need to be submitted to EMD electronically in a comma-separated value (CSV) format on

a daily basis that contains the following table structure (Table 3) and syntax provided in Appendix J. The City of Los Angeles' ICSD staff will ensure electronic submissions of data are parsed and stored correctly into the LIMS database.

“Wet Weather” Determination

The SMBBB Wet Weather TMDL defines “wet weather” as “days with 0.1 inch of rain or greater and the three days following the rain event (Attachment A to Resolution No. 2002-022, Page 4); however, the TMDL does not specify where the 0.1 inch of rain is to be measured. For clarification, the Technical Steering Committee has proposed, in Table 4-3, a set of rainfall gages this shoreline monitoring program will use to determine wet weather days. The locations of these rain gages are illustrated in Figure 14 in Appendix P.

Table 4-3. Summary of rainfall gages to be used for the proposed shoreline monitoring program.

Jurisdictional Group	Rainfall Gages	Comment
1a (Corral subwatershed and west))	Lechuza Patrol (454)	LACDPW “ALERT” Station
1b (Carbon subwatershed and east)	Big Rock Mesa (320)	LACDPW “ALERT” Station
2a (north)	Big Rock Mesa (320)	LACDPW “ALERT” Station
2b (south)	LAX	National Weather Service
3	Ballona Creek (370)	LACDPW “ALERT” Station
4	Lechuza Patrol (454)	LACDPW “ALERT” Station
5	LAX	National Weather Service
6	Redondo Beach City Hall (42C)	LACDPW non-recording gage
7	LACSD – Inside Paseo del Mar pumping station at Western and Paseo del Mar,	LACSD non-recording gage
8 (Ballona Creek watershed)	Ballona Creek (370)	LACDPW “ALERT” Station
9 (Malibu Creek watershed)	Agoura (317)	LACDPW “ALERT” Station

The proposed gages include four ALERT (Automatic Local Evaluation in Real-Time) stations and one non-recording rain gage station owned and operated by the County of Los Angeles. The ALERT stations use tipping buckets with electronic datalogger and real-time radio frequency data telemetry. Data can be obtained at <http://www.ladpw.org/wrd/precip/> under “Near Real-Time Precipitation Map.” The webpage displays 1, 3, 6, 12, 24, 36, 48, and 72 hours accumulated precipitation as well as the last 30 days of precipitation data for all of the County’s 62 ALERT rainfall gages, and is updated every 10 minutes. The City of Redondo Beach will provide data from the non-recording gage to the City of Los Angeles Environmental Monitoring Division. When data from Redondo Beach is not available, data from the LAX rain gage will be used as an alternative. Data from the LAX rain gage can be accessed on the internet at <http://www.nwsla.noaa.gov/climate/climate.html>.

It is important to note that the LACDHS will continue to issue rain advisories based on data from the National Weather Service’s rain gage at USC. EMD will coordinate with LACDHS, when necessary, to schedule accelerated sampling at LACDHS sampling sites.

EMD intends to monitor rainfall data from the USC, LAX and two north Santa Monica Bay rain gages (454 and 318) to assess whether the multi-rain gage approach truly has merit, or if it should be modified or eliminated to streamline the data management process. EMD and the TSC will work with Regional Board staff to make that determination.

Exceedance Determination and Accelerated Sampling

Bacteriological data will be summarized in tabular form on a daily basis by EMD’s Microbiology Unit. Exceedances will be clearly notated and triggers indicating “accelerated monitoring needed” will be programmed into the report. Summer dry weather, winter dry weather, and Wet-Weather spreadsheets with triggers will be created. When bacterial levels no longer exceed AB411 standards, a trigger to return to weekly sampling will be programmed.

Each monitoring agency (EMD, LACDHS, and LACSD) will be responsible for performing its own compliance checking against AB411 standards and accelerating monitoring as required. The 96-hour accelerated testing will be conducted by EMD and LACSD.

Data Reporting

Monthly data summary reports will be submitted to the Regional Board by the last day of each month for data collected during the previous month. Two agencies will submit the monthly reports on behalf of all responsible agencies: EMD on behalf of Jurisdictional Groups 1 through 6, 8, and 9; and LACSD on behalf of Jurisdictional Group 7. LACDHS will submit its data to EMD for compilation for submittal to the

Regional Board. Copies of the monthly reports will be distributed to the lead agency of the appropriate jurisdictional group. If requested, the lead agency of each jurisdictional group will distribute the monthly reports to the responsible agencies within their respective jurisdictional group.

For EMD, laboratory results will be entered into Microsoft Excel spreadsheets that automatically compute results (MPN/100 mL or CFU/100 mL). All monitoring agencies (EMD, LACSD, and LACDHS) will archive their own data within LIMS or a comparable database. Please see Appendix H, “Data Acquisition, Reduction, Validation, and Reporting Procedures.”

